# REMOTE CONTROL SYSTEM OF A HOME NETWORK

## CROSS-REFERENCE TO RELATED APPLICATIONS

Pursuant to 35 U.S.C. § 119(a), this application claims the benefit of earlier filing date and right of priority to Korean Application No. 10-2002-0040039, filed on July 10, 2002, the contents of which are hereby incorporated by reference herein in their entirety.

## TECHNICAL FIELD

The present invention relates to a home network, and in particular, to a remote control system of a home network using UPnP (universal plug and play).

## BACKGROUND ART

With the development of Internet and digital technologies, researches in the field of home network for connecting PCs, network devices, AV devices, electric home appliances, and home automation devices, etc. in a house have been active.

UPnP (universal plug and play) is one of influential industrial standards in the filed home network, and many companies all over the world belong to a UPnP forum.

In general, a UPnP network system consists of plural devices providing a network service and a CP (control point) for controlling a plurality of devices. Herein, the CP is for controlling various devices, and the device can be a PC connected to a home

network and network devices, etc. Through the CP, a user discovers various devices, finds out their description and controls them.

On the other hand, the device transmits an event to the CP and provides a presentation page to the CP, and accordingly, it is possible to control and grasp a state of the device by using a web page.

First, the UPnP protocol structure of a general UPnP architecture version 1.0 will be described with reference to accompanying FIG. 1.

FIG. 1 is an exemplary view illustrating a structure of the UPnP protocol. As depicted in FIG. 1, the UPnP protocol includes a network layer 111; a transport layer 112 having a UDP and a TCP; a presentation/session layer 113 having a protocol such as HTTP, XML (extensible markup language), SOAP (simple object access protocol) and SSDP (simple service discovery protocol), etc. and an architecture such as GENA (generic event notification architecture); and an application layer 114 having information related to a UPnP device, a ForumP and a provider, etc.

In a UPnP network system using the UPnP protocol, communication between the CP and the device is performed by passing an addressing step for allocating an IP address to the device; a determination step by which the CP determines the existence of the device; a description step by which the CP obtains service information supported by the device; a control step by which the CP calls a service of the device; an event step for notifying the CP of the device's status change; and a presentation step for presenting a state of the device and control information.

Among these steps, the determination step for determining the existence of the device will be described in detail with reference to FIG. 2.

FIG. 2 is a diagram illustrating actions involved in the determination step of the UPnP network system. As depicted in FIG. 2, a device 221 performs multicasting of CPs 211, 212, a CP 213 transmits a search message to devices 221, 222, and the device 222 responds.

First, in order to determine that the device exists, the CP performs the determination step by using the SSDP (simple service discovery protocol). Accordingly, when the device 221 connects to the UPnP network, it performs multicasting of an advertisement message, and accordingly the CPs 211, 212 confirms existence of the device through a multicast message from the device 221.

When the CP connects to the UPnP network, the CP 213 multicasts a search message, the device 222 receives the search message and transmits related information to the CP 113 by unicast. Herein, the CP uses the SOAP (simple object access protocol) in order to control the device connected to the UPnP network, and the CP uses the GENA (generic event notification architecture) in order to receive the state event of the device.

However, in the present UPnP device architecture version 1.0, it is assumed that all components of the home network are in a local network, and contact service in a remote place is not considered. Therefore, when there is a contact service request from a remote place, it may not be supported. In more detail, when there is limitation due to

bandwidth or processing performance of a remote terminal, UPnP message translation should be performed according to service types. However, a plan for how to perform mutual operation between a comparatively complicated device and a CP by a simple user command and event has not been presented.

In addition, in order to provide a home network service to various remote terminals, input/output to the remote terminal has to be separated from service contents. However, a plan for performing this separation efficiently has not been suggested. For example, in case of a service using XML (extensible markup language), XML pages are generated regardless of the type of a terminal, and only terminal display format is varied.

In a conventional home network using a standard which is not the UPnP home network, although access from a remote place to the home network could be implemented, there are problems in this implementation.

First, because a user has to log in to a provider's network, there may be a burden to the provider with respect to the scalability. In more detail, because server capacity has to be increased according to increase of the number of users, ineffectiveness may result, processing time delay may result due to a relay server, and the user may feel uncomfortable providing the user's personal information to the provider.

In addition, when a plurality of users access simultaneously, collision may occur in the home network and devices, and thus, it may cause the users inconvenience because there is no clear collision solution.

## SUMMARY OF THE INVENTION

In order to solve the above-described problems, it is an object of the present invention to provide a remote control system of a home network capable of monitoring a state of devices connected to a home network and controlling the devices by using various terminals in a remote place.

It is another object of the present invention to provide a remote control system of a home network capable of controlling devices in a home network by connecting to the home network from a remote place by using a device such as a mobile terminal or a personal computer using a web browser.

In order to achieve the above-mentioned objects, a remote control system of a home network in accordance with the present invention includes a local home network to which a plurality of devices are connected; a remote terminal for controlling the local home network in a remote place; and a remote access server acting as a local CP (control point) and facilitating communication with the remote terminal.

The remote access server is included in the local home network or an Internet provider server, or can be constructed so as to have functions divided into a local home network and a provider server.

A remote control system of a home network includes a device control processing unit operating as a CP (control point) for mutual operation with a plurality of devices and controlling the devices according to a service request from a remote terminal; a remote access service unit for notifying the device control processing unit of the service request

from the remote terminal; and a remote terminal service unit for converting the user request from the remote terminal into a service request, transmitting it to the remote access service unit and transmitting a response from the remote access service unit to a pertinent terminal.

Accordingly, when a web service request of a remote terminal is transmitted from a remote access service unit, the device control processing unit may convert it into at least one UPnP message format. When the service request can be processed with reference to a home network view of a pertinent local CP corresponding to the remote terminal, the device control processing unit does not perform UPnP message exchange. When the device control processing unit is required to respond to a UPnP message from the device, the device control processing unit transmits a notification request to the remote access service unit.

The remote control system of the home network includes a remote access service unit for receiving a user's web request from a remote terminal service unit; transmitting the web request to a device control processing unit by converting it into a corresponding service request according to contents of the web request; and transmitting a web response for a pertinent remote terminal to the remote terminal service unit by having a service view consisting of a set of at least one web document.

The remote access service unit includes a profile database, determines a service view of a remote access service according to service-related information recorded in a profile database, and provides various remote access services to a user and a remote

terminal with reference to the service view.

The profile database includes information such as a list of user's preferred devices, a list of requested events information related to, performance of the remote access terminal, such as a screen size and a type of an input device, a network provider's bandwidth and services available from the provider, and user access priority listed by devices. A service view of the remote access service is determined according to service-related information recorded in the profile database and, accordingly, various remote access services can be provided.

The remote control system of a home network includes a remote terminal service unit for performing mutual communication, such as web request/response with a remote terminal by having a built-in web server, transmitting a web request from a user to a remote access service unit, and transmitting a web response to a remote terminal in a form of a web document generated with reference to a recent service view at the remote access service unit.

The remote control system further includes a setup module for initializing the device control processing unit and the profile database of the remote access service unit; and a communication module having asynchronous notification functions such as e-mail, voice telephone and SMS (short message service).

In addition, the remote access server is constructed to provide services to a plurality of remote terminals via a method for relaying a local CP of the device control processing unit to a remote terminal and a method for simultaneously accessing the

plurality of terminals by the remote access service unit.

The method for relaying a local CP of the device control processing unit with a remote terminal is based on having a local CP for each remote terminal, having one local CP in the device control processing unit, and having a local CP for each type of device.

Because a home network view exists for each terminal having a CP for each terminal is simple and easy to implement.

To facilitate having one local CP in the device control processing unit, given that a single home network view is used, there is a process for extracting information for each remote terminal. A plurality of remote terminals share service requests, and one service result can be transmitted to the plurality of terminals.

To facilitate having a local CP for each type of device, it is possible to simplify each local CP. However, a process for extracting information for each service from the home network view for each type of the device is required.

To facilitate simultaneously accessing the plurality of terminals, a mechanism for solving collision in the local home network is included, specifically, a local home network collision solving mechanism for simultaneous access of the plurality of remote terminals.

The remote access service unit includes a home network collision solving mechanism performed at a home network level, a device level, an operation level, or performed at both a device level and an operation level. The home network collision solving mechanism performed at the operation level solves a collision problem

according to a user priority rank, an order of remote access connection and an order of operation.

The home network collision solving mechanism is stored in the device access database included the profile database.

Other objects, characteristics and advantageous of the present invention will become clear through detailed descriptions with reference to accompanying drawings.

## BRIEF DESCRIPTION OF DRAWINGS

The accompanying drawings, which are included to provide a further understanding of the invention and are incorporated in and constitute a part of this specification, illustrate embodiments of the invention and together with the description serve to explain the principles of the invention.

In the drawings:

FIG. 1 is an exemplary view illustrating a structure of a UPnP protocol;

FIG. 2 is a state diagram illustrating a determination step for determining existence of a device by CPs (control point) in a UPnP network;

FIG. 3 is a block diagram illustrating a remote control system of a home network in accordance with the present invention;

FIG. 4 is a block diagram illustrating a remote access server in accordance with the present invention;

FIG. 5 is a flow chart illustrating UPnP conversion processes using a single clock

point;

FIG. 6 is an exemplary view illustrating a device access database in accordance with the present invention; and

FIG. 7 is a detailed block diagram illustrating the remote access server in FIG. 4.

## DETAILED DESCRIPTION OF THE INVENTION

Hereinafter, the preferred embodiments of a remote control system of a home network in accordance with the present invention will be described with reference to accompanying drawings.

FIG. 3 is a block diagram illustrating a remote control system of a home network in accordance with the present invention.

As depicted in FIG. 3, the remote control system of the home network in accordance with the present invention includes a home network portion in which a PC 311, a refrigerator 312, a TV 313 and an Internet gateway 314 are connected to a UPnP network; a provider network portion in which provider servers 321, 322 are connected to the Internet; and a remote terminal portion having a radio terminal 331 and a user PC 332.

A remote access server exists in the PC 311 or the Internet gateway 314 on the home network, and the remote access server transmits a state of the plurality of network devices to a user in a remote place by controlling the plurality of network devices upon receiving a user command.

In the remote control system of the home network in accordance with the present invention, it is assumed that the provider servers 321, 322 have no function or have a very limited function.

Because the remote server connection and web document service are performed in the remote access server located in a house, the only function that the remote access server needs from the outside is notifying a DNS (domain name server) or an IP address thereof.

In a fixed IP or a static DNS mode, it is possible to construct the remote access server in static configuration, and the provider's function is unnecessary.

On the other hand, in a variable IP or a dynamic DNS, although the provider's function is necessary, the role is very limited in comparison with the conventional provider-based remote access service.

Accordingly, in the remote control system of the UPnP home network in accordance with the present invention, by using a plurality of remote terminals supporting web browsing according to the UPnP device architecture version 1.0 standard, operation of the remote access server, facilitates efficient performance of various remote access services for the home network.

The remote access server presented by the remote control system of the home network in accordance with the present invention includes the web server, and has functions for processing all remote services from user log-in to user log-out. As described above, the remote access server receives help from the provider only for a

problem related to an IP or a DNS address.

The remote access service can be divided into a control process and a notification process. Herein, the control process refers to transmitting a web request of the user to a device control processing unit and responding to the web request and the notification process refers to converting a determination message or an event message generated in the UPnP device into a notification request and indicating the message in the web document

In the present invention, it is assumed the remote terminal has only a web browsing function, notification of contents by the remote terminal is indicated in web documents, web documents are updated periodically by the web browser having an automatic updating function, or the user checks new web documents by himself/herself.

If it is possible for a remote terminal to support the system, a method for notifying the remote terminal of a UPnP device message asynchronously, such as through an e-mail, can be used.

FIG. 4 is a block diagram illustrating a remote access server in accordance with the present invention. As depicted in FIG. 4, the remote access server includes a device control processing unit 430; a remote access server unit 420; and a remote terminal service unit 410. It is assumed that the remote access server is loaded in the Internet gateway 314 in FIG. 3.

The device control processing unit 430 communicates with the remote access service unit 420 by an API (application program interface) or other interface methods

while simultaneously operating with home network devices, such as the PC 311, the refrigerator 312 and the TV 313 in FIG. 3, by using UPnP protocol messages. The core of the device control processing unit 430 is the UPnP CP.

In the present invention, it is possible to have a UPnP CP for each type of device, to allocate a UPnP CP to each remote terminal in service or to have only one UPnP CP.

In general, a specific CP can control only one specific type of device, and a common CP can control all UPnP devices. However, their functions are limited.

When there is a UPnP CP for each type of device, each CP controls the same type of devices, and construction of each CP can be more simplified than with the other cases. It is required to perform distributing requests from the remote terminal according to the types of devices, and provide information transmitted from the UPnP device to the remote terminal connected to each device.

When a CP is allocated to each remote terminal, it is easy to link the remote terminal with the device. However, all devices to be controlled by each remote terminal must have a CP function.

When there is only one CP, it is required that the CP has a function capable of controlling all kinds of devices and connects a device to a remote terminal. However, when providing a service to a plurality of remote terminals, it is possible to reduce the number of UPnP message exchanges by using a service for other terminals.

When using a CP which can control a plurality of devices, flexible configuration of a CP using, for example, Internet download is assumed.

When a single CP is allocated to the device control processing unit 430, requests from a plurality of remote terminals can be efficiently satisfied. In more detail, when two users make similar requests, those requests are unified and mutually performed with a pertinent device.

For example, when a user 1 subscribes for an event of a state variable A from a device 1 between one o'clock and two o'clock, and a user 2 subscribes for an event of a state variable A from a device 1 between one thirty and three o'clock, the device control processing unit 430 performs the service for user 2 by using the event for user 1 for the first thirty minutes. Then the device control processing unit 430 performs the pertinent service for user 2 through event subscription for the remaining one hour.

Accordingly, when the single device control processing unit is used, it is possible to reduce traffic of the home network and avoid problems caused by multiple CPs.

When the device control processing unit 430 includes a single CP, UPnP conversion is performed by the steps shown in FIG. 5. FIG. 5 is a flow chart illustrating UPnP conversion processes for the single device control processing unit.

Herein, it is assumed that requests from the remote access service unit 420 are stored in the order received and processed in a UPnP service request queue. In addition, it is assumed that there is a service request table in which a present proceeding service request is stored and in which a service number item is included.

First, it is determined whether there is a service request when the UPnP service request queue is empty as shown at step S501, When it is determined that the UPnP

service request queue is not empty, the present service request is compared with the service request table as shown at step S502.

It is then determined whether there is a newly requested service in the service request table. In more detail, it is determined whether the existing service request is similar to the newly requested service as shown at step S503. When it is determined that the newly requested service is not similar to the existing service request table, the newly requested service is recorded in the request table and, if necessary, the device control processing unit 430 transmits an appropriate UPnP message as shown at step S506.

On the other hand, when it is determined that the existing service request is similar to the newly requested service, it is determined whether it is possible to accept a new service request as shown at step S504. When it is determined that it is possible to accept the newly requested service request, the newly requested service is added to the existing service request table by adding a new service number to the service request table and, if necessary, the device control processing unit 430 transmits an appropriate UPnP message as shown at step S507.

On the other hand, when it is determined that it is not possible to accept the newly requested service, the service request in the service request table is adjusted in consideration of portions not accepted in the existing service request and the device control processing unit 430 transmits an appropriate UPnP message, if necessary, as shown at step S505.

In the meantime, in the step S501, when it is determined that the UPnP service request queue is empty, it is determined whether the UPnP conversion process is finished as shown at step S508, and it is determined to finish the UPnP conversion process or start the UPnP conversion process again according to the determination.

Afterward, the above-described UPnP conversion process is performed repeatedly.

Each CP of the device control processing unit 430 includes a home network view. The home network view can be implemented in various forms. Generally, it consists of information such as a device list controlled by the UPnP CP and a subscribing event list, which is same as a state of each device. In addition, when there is a single CP or a CP for each type of device, the home network view can be efficiently used for providing a service to another remote terminal by using a service request of one remote terminal.

As described above, the UPnP involves steps such as addressing, discovering, describing, control, event and presentation. Herein, message exchange is included in each step and messages can be largely divided into a command from the CP and a notification from the device.

The command from the CP includes a multicast-search HTTPMU (HTTP multicast over UDP) in the discovering step, a HTTP GET message in the describing step, an action and query variable SOAP (simple object access protocol) message in the control step, a subscription GENA (generic event notification architecture) format message in the event step and a HTTP GET message in the presentation step.

The notification from the device includes an advertisement response unicast message in the determining step and an event GENA format message in the event step. The addressing step is a pre-step for starting UPnP and messages exchanged in the addressing step are not UPnP messages.

UPnP conversion is performed in the device control processing unit 430, and the conversion format is different depending on the service.

Ultimately, the UPnP conversion is for solving differences between the home network view of the device control processing unit and the service view of the remote access service unit 420. For example, a web request occurs by one click of the user in the web page, and it is converted into a service request. However, when useful information is already in the home network view by a service request of another remote terminal, UPnP operation does not occur.

When it is necessary, the device control processing unit 430 updates the home network view by comparing determination or event from the UPnP device with the present home network view, and transmits a notification request to the remote access service unit 420.

The remote access service unit 420 receives the user's web request from the remote terminal service unit 410, transmits the request to the device control processing unit 430 after converting the request into a service request format appropriate for the device control processing unit 430, receives information about a state of the UPnP device from the device control processing unit 430, and transmits the information to the

remote terminal service unit 410 for transmission to the remote terminal.

According to the contents, the user's web request is converted into service requests such as for starting remote access service, operation of a device, update of the device state, event subscription, and ending remote access service. In addition, the remote access service unit 420 receives a notification request from the device control processing unit 430, and updates a related service view when it is necessary.

Each remote service managed by the remote access service unit 420 has a respective service view. In addition, the service view shows the home network on the user's remote terminal and consists of web documents related to the home network to be controlled by the user such as a device state, a control page, a device list page and a user option page.

The remote access service unit 420 changes a service view according to, for example, variation of the home network view, result of the user control command, and a user's option change. The service view is generated as a form of active web page. The remote access service unit 420 includes a document generator for making contents for transmission to the user as web documents, such as XML.

The remote access service unit 420 stores and maintains a service profile database having categories, such as user, terminal type, and Internet connection type.

The profile database has static configuration, or it can be updated by using an option page of the service view after the user is connected to the remote access service. In addition, the profile database includes information such as a list of the user's

preferred devices, a list of requested events, performance of the remote access terminal, such as a screen size and an input device kind, bandwidth and services provided from the user network, and user access priority for UPnP devices. The service view and the UPnP conversion format are varied according to the information while the service is in progress.

Whenever the remote terminal requests a service, the remote access service unit 420 can allocate one service module and can include one integrated service module. Under all circumstances, a device access database for supporting simultaneous access of plural users must be present in the profile database.

The device access database includes data, such as each user's priority rank or access probability, according to a share (collision) level of the users, devices, or operations in the devices.

In addition, a type of the device access database is determined according to a device access policy for a particular implementation.

The device access database according to the device access policy will be described in more detail with reference to accompanying FIG. 6.

FIGS. 6(a)-(d) are exemplary views illustrating the device access database used in the remote access server. FIG. 6(a) is an exemplary view illustrating the device access priority list table according to the above-mentioned device access policy. FIG. 6(b) is an exemplary view illustrating a share type table according to device operations and to the above-mentioned device access policy. FIG. 6(c) is an exemplary view

illustrating authority according to priority lists. FIG. 6(d) is an exemplary view illustrating authority according to users and operations supported by the device.

The policy regarding simultaneous access to a device consists of several rules.

1. There is a use priority list.

2. It is determined whether the device is exclusive at every operation.

3. When collision occurs during an operation of the exclusive device, the collision is solved according to the user priority rank.

4. In case of the same priority rank, priority is given to a user starting operation first.

5. Even if the priority of a new user is higher, an existing operation cannot be stopped while the operation is performed.

The device access priority rank list in FIG. 6(a) records a priority list according to users for all devices in the home network.

As shown in FIG. 6(a), in the device access priority rank list, a priority rank of the device 1 is allocated to users in the order of user C, user B and user A. In more detail, when a communication from user A collides with a communication from user C in the device 1, user C has priority.

As shown in FIG. 6(b), a share type table according to device operations shows share types of device 2. Herein, operations 1 and 3 indicate access by other users is impossible while a pertinent operation is being performed.

FIG. 6(c) is an exemplary view showing access authority according to priority

ranks of operations of each device. When a priority rank is 1, authority is given to all operations. When a priority rank is 2, authority is given only to an operation 3. When a priority rank is 3, authority is given only to an operation 2.

As described above, there is a method for providing authority by users regardless of the priority rank.

FIG. 6(d) is an exemplary view showing authority according to users and device operations. As shown in FIG. 6(d), device 2 provides authority for each operation by users.

Examples in FIGS. 6(a)-(d) show simultaneous access in the device operation level. It is also possible to perform simultaneous access control in the device unit or the home network unit. In addition, it is also possible to perform simultaneous access control by compromising the device unit and the operation unit.

For example, it is possible to perform access control to device 1 at the device level and perform access control to device 3 at the operation level. In more detail, when a collision occurs, the collision can be solved by considering a user having higher priority, considering a user starting the remote access service first, and considering a user starting a specific operation of a specific device first.

Of course, there can be other collision solving methods, such as those considering mixing priority, remote service access order, and operation order. Herein, a collision solving method according to priority rank is performed between the users having different priority ranks, and a collision solving method according to a user

starting an operation first is performed between the users having the same priority rank.

Policy for collision solving mechanism can have various forms and complexities depending on share units and collision solving methods.

In FIG. 4, the remote terminal service unit 410 communicates with the remote terminal in a web request/response mode. In a control process, the remote terminal service unit 410 transmits a user's request to the remote access service unit 420 and transmits web documents from the service unit 420 to the user in a web response mode.

In a notification process, the remote terminal service corresponds to web browser automatic update or user confirmation by providing a new web document to the user.

The remote terminal service unit 410 includes a built-in web server and a space for storing web documents. In the web document storing space, style documents for various remote terminals can be stored by synchronizing with the profile database of the remote access server. For example, when using XML, an XSL stylesheet is stored in the web document storing space, and the XSL stylesheet can be applied to the remote terminal before transmitting the XML document to the remote terminal.

The event from the UPnP device can be transmitted to the user as e-mail, SMS, or voice telephone. The remote terminal service unit 410 has to include pertinent modules because of this.

FIG. 7 is a detailed block diagram of the remote access server. As depicted in FIG. 7, the remote access server consists of the remote terminal service unit 410; the remote access service unit 420; the device control processing unit 430; and the setup

module 440 for static configuration and setup.

The device control processing unit 430 includes the UPnP integrated CP module 431. In addition, the remote access service unit 420 includes the service branch module 421; the service module 422; the UPnP conversion module 423; the profile database 424, and the XML module 425 as a character generator.

The remote terminal service unit 410 includes the web server module 411, the XML document DB 412, and the e-mail module 413.

The setup module 440 has functions for controlling many kinds of devices, such as a download function for statically configuring the UPnP integrated CP module 431, which is in the device control processing unit 430. The setup module 440 also has functions, such as for initializing and updating the profile database 424 of the remote access service unit 420.

The profile database 424 has a device access database.

The remote access service unit 420 generates each service module 422 for each connected remote terminal and provides a remote access service. However, only an integrated CP is shown in the UPnP network as the one and only remote access CP.

The service branch module 421 of the remote access service unit 420 performs generation and collection of the service module 422 according to the user's requests for connecting and ending, transmits web requests to a pertinent service module and transmits a notification request received from the service module to the e-mail module 413 of the remote-access service unit 410. In more detail, it is assumed that the remote

terminal having a function for processing asynchronous notification is supported.

The remote access server, which is operated based on XML, generates required XML documents dynamically in the XML module 425 corresponding to the document generator of the remote access service unit 420 in a general model, and provides the XML documents to the user. In addition, the remote access server performs services to various terminals by using, for example, the XSL stylesheet according to the device terminal and the user's taste.

In the embodiment of the present invention, controlling and checking of the home network devices and accessing the home network from a remote place have been described. Based on the described embodiment of the present invention, more services can be provided as follows.

1. When a user stays away from home for a long time, it is possible to manage a specific home network from a remote place. It can be performed easily when the remote access server describes the home network as XML documents.

2. In a method for managing the home network devices by a manufacturing company selling them, selection ranges can be increased. In the conventional method, when there is a need to report a device state to the manufacturing company, the device requests a connection to the home network and reports the need through the Internet connection.

However, the manufacturing company can access to the device periodically, for example, every six months, and check the state of the device. In that case, it is

assumed that the user provides a limited home network access right to the manufacturing company and there is no need to implement a manufacturing company report function for the home network device. Accordingly, efficient maintenance and management of low-priced simple devices is possible.

3. The home network can be applied to web services. If the communication of the home network is performed in XML (as one of web service standards), it is possible to construct a service, which may be available to the outside, and other kinds of applications are possible.

The present invention, by making a light remote terminal having various kinds of web browsing functions for access to the UPnP home network from a remote place, there are search advantages.

First, it is possible to provide a customized service according to the type of a remote terminal, user preference, and network environment.

In addition, when plural terminals attempt to access the home network simultaneously, it is possible to process the access attempts efficiently and solve collisions which can occur in the home network devices.

In addition, because only web browsing function is required for the remote terminal and there is little requirement, supply is very easy.

As the present invention may be embodied in several forms without departing from the spirit or essential characteristics thereof, it should also be understood that the above-described embodiments are not limited by any of the details of the foregoing

description, unless otherwise specified, but rather should be construed broadly within its spirit and scope as defined in the appended claims, and therefore all changes and modifications that fall within the metes and bounds of the claims, or equivalence of such metes and bounds are therefore intended to be embraced by the appended claims.